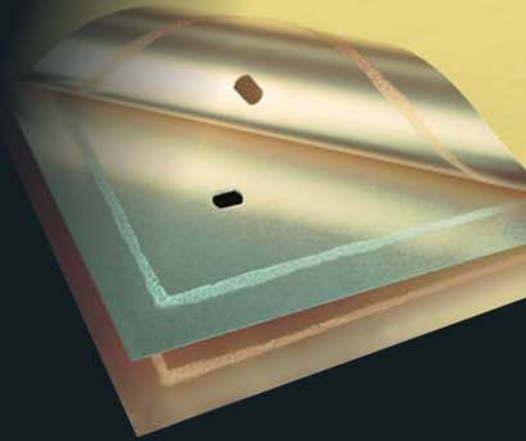




## Protecting Your Copper Foil

- ✓ Copper foil with aluminium separator sheet
- ✓ Easy use of free-standing thin foils 5  $\mu\text{m}$  and 9  $\mu\text{m}$  for high end multilayers
- ✓ Less material handling and reduced operator labor costs
- ✓ Improved yield by elimination of airborne particles and resin dust

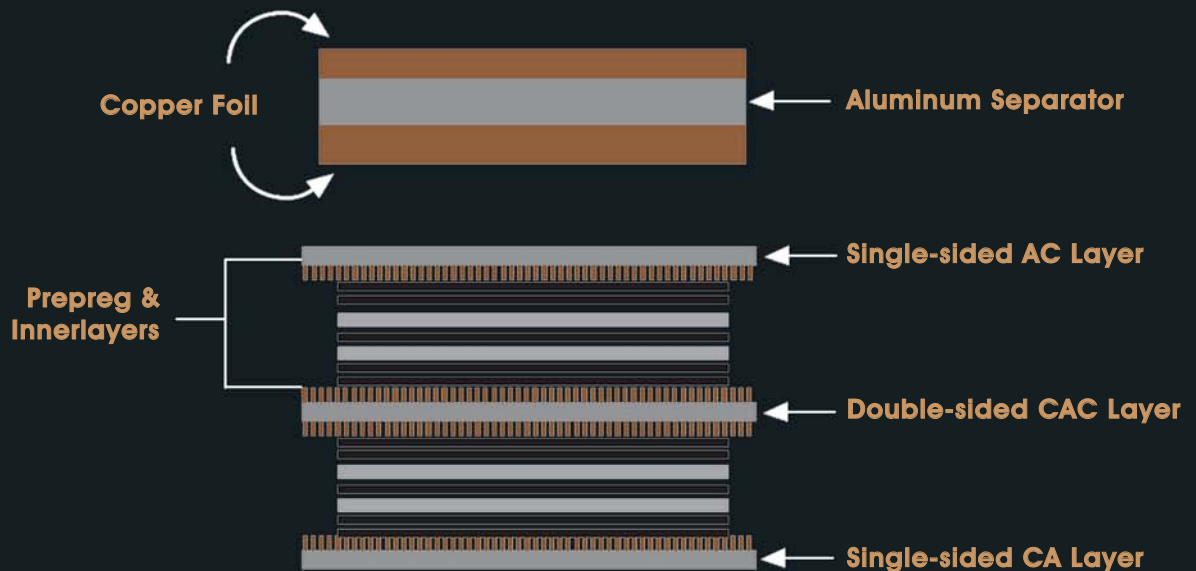


**CAC (Copper Aluminum Copper)** is a thin aluminum separator with an impressive difference ... it is sandwiched between two sheets of copper foil, which preseals the critical copper surfaces from exposure to airborne particles and resin dust. During multilayer lamination, the copper foil releases from the aluminum separator sheet and becomes the outer layer foil for the printed circuit board, above and below.

The proprietary CAC process ensures that the copper surfaces are free of any particles or dents five microns or larger. The net result is consistently higher yields on high density, fine line and gold feature circuit boards.

Costly manual handling and cleaning steps are eliminated, which reduces labor costs and improves cycle time and throughput during the lay-up process. CAC is also the best and most economical solution for using difficult to handle thin foils, reverse treated and double treated copper foils.

- U.S. Patent No. 5,153,050
- U.S. Patent No. 5,674,596
- U.S. Patent No. 5,725,937
- U.S. Patent No. 5,942,315
- U.S. Patent No. 5,951,803
- U.S. Patent No. 6,048,430



DELIVERING HIGHER YIELDS  
IN EVERY PACKAGE

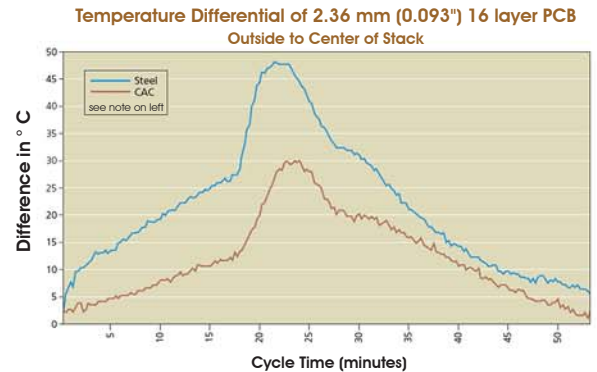
## ADVANTAGES

- Higher Yields** CAC improves post-electrical test and final yields with the degree of improvement keyed to circuit density, line width, and line spacing. CAC ensures that critical copper foil surfaces remain free from foreign material and airborne particulate contaminants before and during lamination.
- Less Material Handling** In conventional pin lamination of a ten-high book, 31 individual copper foil and aluminum separator components must be carefully placed over pins in the lay-up of a multilayer book. CAC reduces the number of components that must be handled to 11, for a 65% reduction.
- Reduced Operator Labor** In the same ten-high lay-up, operators must wipe 40 surfaces to ensure the best possible surface cleanliness. Because CAC delivers pre-sealed from the factory, operator wiping of critical surfaces is no longer necessary. The combined productivity gains are typically 30% to 50%.
- Eases Use of Thin Foils, Reverse Treated and Double Treated Foils** Because the foil is attached to a rigid separator, CAC with thin foils, 5  $\mu\text{m}$  (0.125 oz), 9  $\mu\text{m}$  (0.25 oz) or 12  $\mu\text{m}$  (0.375 oz), significantly eases creation of fine lines and spaces as small as 50  $\mu\text{m}$  (0.002").
- Elimination of Foil Wrinkles** Handling and registration of thin copper foil onto lamination fixture pins can cause handling wrinkles, a major source of foil pinholes. Another source of foil wrinkles, thermal expansion mismatch between copper foil and steel separators, is eliminated by the use of aluminum separators.
- Improved Thermal Conductivity** The use of CAC can reduce inherent temperature differences in a lamination book due to its improved thermal conductivity as compared to steel separators. See graph to the right.

**Note:**

**Steel:** 5 high with 1.58 mm (0.062") steel separator plates.

**CAC:** 7 high using 0.50 mm (0.020") thick CAC shows 60% decrease in temperature variation from outside to center of stack. This means more consistent heat rise and cool down throughout the stack.



## SPECIFICATIONS

### Copper Foil

Other foil types, such as Reverse Treated, Low Profile and Double Treated Foil, are available upon request.

Copper Weights	
5 $\mu\text{m}$	0.125 oz
9 $\mu\text{m}$	0.25 oz
12 $\mu\text{m}$	0.375 oz
18 $\mu\text{m}$	0.5 oz
35 $\mu\text{m}$	0.1 oz
70 $\mu\text{m}$	2.0 oz
105 $\mu\text{m}$	3.0 oz
140 $\mu\text{m}$	4.0 oz

### Aluminum Separators

CAC selects the best aluminum alloys for use as CAC lamination separators. All aluminum used is hardened, to meet the demanding requirements of today's lamination and drilling processes.

Aluminum Separator Thicknesses	
Aluminum separators are available in the following thicknesses with tolerances of +/- 0.025 mm (0.001")	
0.18 mm	0.007"
0.25 mm	0.010"
0.38 mm	0.015"

### CAC® Lamination Foil

CAC is available in a double sided version known as CAC Lamination Foil (with copper foil on both sides of the aluminum separator), as well as in a single sided version (as CA® Lamination Foil and AC Lamination Foil). CAC sheets can be supplied in varying sizes with and without registration holes according to the varieties of customer specifications.

## GENERAL PROCESSING GUIDELINES

For best results, refer to the supplier's recommendations for lamination conditions. An example of a lamination cycle follows.

**Note:**

**Vacuum zone:** typically zero pressure

**Low pressure zone:** typically 0.35 n/mm<sup>2</sup> (50 psi) with a typical heat rise of 5° C ± 2° C per minute

**High pressure zone:** typically 1.38-1.73 n/mm<sup>2</sup> (200-250 psi)

**Cool down zone:** typically 0.35 n/mm<sup>2</sup> (50 psi) with 3° C ± 2° C per minute cool down to below resin Tg then increasing to 5° C ± 2° C per minute

